

CLAIMS

What is claimed is:

1. An output circuit for use in an implantable cardiac stimulation device, comprising:
 - a voltage supply circuit that provides an output voltage; and
 - a control circuit coupled to the voltage supply and comprising an H-bridge and a pulse-width modulation circuit coupled to the H-bridge, wherein the control circuit is operative to act upon the output voltage to provide a stimulation output having a pulse-width modulated waveform.
2. The output circuit of claim 1 wherein the H-bridge includes a first leg and a second leg, each leg including a first switching device that controls the waveform shape of the stimulation output.
3. The output circuit of claim 2 further comprising a pulse-width modulation circuit coupled to the first switching device of each leg of the H-bridge.
4. The output circuit of claim 2 wherein each leg includes a second switching device that controls polarity of the stimulation output.
5. The output circuit of claim 4 further comprising a polarity control circuit coupled to the second switching device of each leg of the H-bridge.
6. The output circuit of claim 2 further comprising a comparison circuit that compares a desired output waveform to a timing waveform and provides control signals, the first switching devices being responsive to the control signals.

7. The output circuit of claim 1 further comprising a capacitor coupled between the legs of the H-bridge.

8. The output circuit of claim 7 wherein the capacitor is a non-polar capacitor.

9. The output circuit of claim 7 further comprising an inductor coupled in series with the legs of the H-bridge and a pair of back diodes coupled to the inductor.

10. The output circuit of claim 1 wherein the H-bridge comprises a plurality of legs, each leg including output voltage modulating device.

11. The output circuit of claim 10 wherein each leg further includes a polarity control device.

12. The output circuit of claim 11 wherein the H-bridge comprises first, second, and third legs and wherein, when the polarity control device of the first leg controls the polarity, the output voltage modulating devices of the second and third legs are configured to independently modulate the output voltage.

13. An output circuit for use in an implantable cardiac stimulation device, comprising:

- a voltage supply circuit that provides an output voltage and
- a control circuit comprising an H-bridge that pulse-width modulates the output voltage to provide a stimulation output having a pulse-width modulated waveform, the H-bridge comprising a plurality of legs, each leg including a stimulation output polarity control device and a stimulation output modulating device.

14. The output circuit of claim 13 further comprising pulse-width modulation circuit coupled to the stimulation output modulating device of each leg of the H-bridge.

15. The output circuit of claim 14 further comprising a polarity control circuit coupled to the stimulation output polarity control device of each leg of the H-bridge.

16. The output circuit of claim 13 further comprising a comparison circuit that compares a desired output waveform to a timing waveform and provides control signals, the stimulation output modulation devices being responsive to the control signals.

17. The output circuit of claim 13 further comprising a capacitor coupled between each pair of adjacent legs of the H-bridge.

18. The output circuit of claim 17 wherein each capacitor is a non-polar capacitor.

19. The output circuit of claim 13 wherein the H-bridge comprises first, second, and third legs and wherein, when the polarity control device of the first leg controls the polarity, the stimulation output modulating devices of the second and third legs are configured to independently modulate the output voltage.

20. An output circuit for use in an implantable cardiac device comprising:

- a power source that provides an output voltage;
- a pulse-width modulation circuit that generates a pulse-width modulation control signal corresponding to a desired waveform;
- and

an H-bridge coupled to the power source and to the pulse-width modulation control circuit that modulates the output voltage to provide a stimulation output having the desired waveform.

21. The output circuit of claim 20 further comprising a comparison circuit that compares the desired output waveform to a timing waveform and provides a control signal to the pulse-width modulation circuit.

22. The output circuit of claim 20 wherein the H-bridge comprises a plurality of legs, each leg including output voltage modulating device.

23. The output circuit of claim 22 wherein each leg further includes a polarity control device:

24. The output circuit of claim 23 wherein the H-bridge comprises first, second, and third legs and wherein, when the polarity control device of the first leg controls the polarity, the output voltage modulating devices of the second and third legs are configured to independently modulate the output voltage.

25. The output circuit of claim 22 further comprising a capacitor coupled between adjacent legs of the H-bridge.

26. The output circuit of claim 25 wherein the capacitor is a non-polar capacitor.